



**ENVIRONMENTAL AND PUBLIC PROTECTION CABINET  
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## **DNR Advisory Bulletin - Flyrock Incidents**

Incidents involving flyrock are occurring at unacceptable levels. In the past few months, there have been several very serious incidents reported from mines operating in Eastern Kentucky. Each of these events could have resulted in serious injuries or fatalities. Investigations have revealed that significant damage to property and structures has occurred.

Experience has shown that nearly all incidents of flyrock could have been avoided if the proper precautions had been taken. It is the responsibility of all parties to ensure that careful consideration is given to the prevention of flyrock from the earliest stages of blast planning.

### **Causation**

Investigations of recent incidents indicate blast designs are not considering all of the site parameters and geologic information available. Common underlying causes were found to be:

- Lack of clearly defined roles and responsibilities for those associated with blasting operations.
- Improper hole placement as a result of poor coordination between mine management, drilling crew and blasting professionals.
- Blasts that are affected by unforeseen geologic conditions. Because weathering of the surface rock is generally more pronounced than in the deeper lying strata, it is important that the surface rock is inspected for faults and joints. Fissures, joints and other planes of weakness are not necessarily the same from location to location even within the same blast area. Closely inspecting previous excavations will provide significant information about the rock structure.
- Incomplete or poorly conducted risk assessments. The area surrounding the blast site must be inspected to determine distances to protected structures e.g. residences, roads, public places and considered in the design of protective measures. Additionally, a thorough inspection of the drill bench must be made to determine if any hazards exist prior to loading the shot, such as the ability of any catch or safety benches to contain the shot material.

## **Flyrock Prevention**

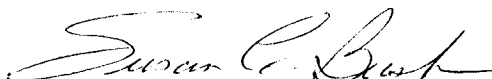
Proper blast design and the use of standard industry techniques are the primary methods for avoidance of flyrock.

- Orient the free face away from protected structures.
- Ensure a powder factor sufficiently low (taking into account rock type) to eliminate the possibility of excessive loading.
- Choose a burden of sufficient thickness and competency to reduce the possibility of flyrock.
- In general, the stemming length should not be less than 0.7 times the burden. In wet boreholes or if the drill cuttings are wet, crushed stone is recommended for stemming.
- Take special care when carrying out secondary blasting to avoid overloading.
- Maintain strong lines of communication and coordination between mine management, drilling crew and blasting professionals.

## **Communication**

In order for a blaster to safely determine the amount of explosive to be loaded in boreholes, the condition of the material being blasted must be identified. A blaster must be cognizant of voids, mud seams, cracks and other rock irregularities. Often these irregularities occur in only a localized portion of the rock to be blasted. Flyrock may occur if the blaster is unaware of these conditions. An experienced driller can determine the presence and location of these irregularities in the rock being drilled from the way the drill operates.

Drill logs are an important source of information for the blaster. The drill log should document any and all conditions concerning the rock being drilled and prepared for blasting. The log should be provided to the blaster prior to loading any explosives into the boreholes. Drill logs should note depth of hole, angle of hole, voids, competency of rock, loss of air, or lack of drill cuttings. All boreholes should be inspected and measured by the blaster before loading begins. Any hole found to be badly cracked or close to a crack, fracture, or void should not be loaded with explosives and should be stemmed to the collar.



Susan C. Bush  
Commissioner